GOVERNMENT OF ANDHRA PRADESH
A B S T R A C T

Municipal Administration & Urban Development – Faecal Sludge and Septage Management as a part of implementation of reforms under the AMRUT for the year 2016-2017 – Approved – Orders – Issued.

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MUNICIPAL ADMINISTRATION & URBAN DEVELOPMENT (UBS) DEPARTMENT

G.O.Ms.No.134 Dated:31-03-2017

Read:-

From the Director of Municipal Administration, Guntur
Letter Roc No. 1638/2017- M3 dated 14.03.2017.

*** ***

O R D E R:

In the circumstances reported by the Director, Municipal Administration, Guntur in the reference read above, Government hereby approve " Faecal Sludge and Septage Management" Policy together with Operative Guidelines for Urban Local Bodies in Andhra Pradesh as annexed to this order.

The Director, Municipal Administration, Guntur shall take necessary further action in the matter.

(BY ORDER AND IN THE NAME OF THE GOVERNOR OF ANDHRA PRADESH)

R.KARIKAL VALAVEN
PRINCIPAL SECRETARY TO GOVERNMENT

To
The Director, Municipal Administration, Gorantla, Guntur.
Sf/Sc

//FORWARDED BY ORDER//

ASSISTNT DIRECTOR

FAECAL SLUDGE AND SEPTAGE MANAGEMENT:

POLICY AND OPERATIVE GUIDELINES FOR URBAN LOCAL BODIES IN ANDHRA PRADESH

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1. Introduction

Urban Andhra Pradesh was declared Open Defecation Free by the Honourable Chief Minister, Shri Chandrababu Naidu, on October 2, 2016. Achieving this has been a major success in terms of infrastructure building, human development, sanitation, and public health. It was the crucial first step in creating an Andhra Pradesh whose citizens can enjoy clean and sanitary cities; however, it is not the only requirement. Over ninety percent of urban households in Andhra Pradesh use on-site sanitation systems, such as septic tanks, pit latrines, and soak pits.

As these containment facilities are not connected to any larger system, they need to be emptied periodically. When emptied, the refuse from these tanks, called "faecal sludge" and "septage," is usually thrown directly into the environment without any processing or treatment – this sludge goes directly from septic tanks into rivers or onto fields, often within municipal boundaries. "Faecal Sludge" includes the liquids, solids, as well as the fats, oils and grease (scum) that accumulate in containment units over time, while "Septage" usually refers to the refuse of septic tanks in particular. As a variety of containment typologies exist in Andhra Pradesh, these regulations will primarily refer to faecal sludge and septage, though the two terms are used here interchangeably. This refuse, called either faecal sludge or septage, is harmful and contains many pathogens hazardous to human health. Accordingly, the unregulated dumping of faecal sludge into the environment is an ongoing public health and environmental crisis both in Andhra Pradesh and across the country.

The central government has taken notice. Accordingly, when the Ministry of Urban Development (MoUD), Government of India formulated the National Urban Sanitation Policy (NUSP) in 2008 in order to provide urban Indians with clean, healthy, liveable, and sanitary community-driven cities and towns, a set of recommendations regarding septage (also known as faecal sludge) was included. The NUSP recommends that septage be collected, transported, and disposed of properly at well-maintained purpose-built treatment facilities.

There are two major sources of standards and guidelines for septage management in India: The National Building Code, last revised in 2005 by the Bureau of Indian Standards (BIS); and The Manual on Sewerage and Sewage Treatment, prepared by the Central Public Health and Environmental Engineering Organization (CPHEEO) in 2012.

While the CPHEEO Manual assigned responsibility for checking sludge accumulation on a daily basis and determining emptying times to households, the CPHEEO Manual also recommended that state and municipal governments draw up action plans and implementation budgets for extracting, treating, and disposing of the sludge generated in on-site facilities in accordance with the "Septage Management Guidelines" (MOUD, 2013). Further, the Ministry of Urban Development in 2016 published set of guidelines on Faecal Sludge and Septage Management (FSSM) which can provide further support to ULBs.

Faecal sludge and septage management (FSSM) includes the entire process of design, collection, safe treatment& disposal of faecal sludge /septage based on generation of waste. A comprehensive program that regulates periodic cleaning of on-site containment, , as well as septage transport, treatment, re-use, and disposal is important in the context of our rapidly urbanizing state.

1.1 Current Scenario in Andhra Pradesh

Andhra Pradesh is a rapidly urbanizing state; 146 lakh people, or 29.6% (Census 2011) of the state's population live in urban areas, and urban populations are growing at an accelerating pace. In accordance with the Honourable Chief Minister's push to create an Andhra Pradesh blessed by total sanitation, Faecal Sludge and Septage Management, is being accorded highest priority by the Government of Andhra Pradesh.

There are 14 Municipal Corporations and 96 smaller Municipalities in the state. Of these combined 110 Urban Local Bodies only five local bodies possess partial sewage treatment plants (STPs), DPRs are currently being developed to construct underground sewerage systems (UGSSs) and STPs in some AMRUT towns. None of Andhra Pradesh's ULBs will enjoy even 50% sewerage coverage upon the completion of this infrastructure in the short to medium term.

ULB-wise capacities of existing STPs is therefore given following table on the next page.

Table 1 - ULB Wise Capacity of STP's (2015)[1]

#	City/Town	STP Location	Status	Capacity (MLD)
1	Rajahmundry	Rajamundry, ED District	Operational	30
2	Tirupati	Tukivakam	Operational	25
3	Vijayawada	Azithsinghnagar	Operational	27.27
4		Azithsinghnagar	Under Construction	40
5		Auto Nagar	Operational	10
6		Ramalingeswara Nagar	Operational	10
7		Poornanadampet	Operational	14
8	Vishakhapatnam	Appughar	Operational	25

9		Muvasalava	Under Construction	13
10		Old Town	Under Construction	38
11		Port Area	Operational	10
12	Vizianagaram	Pedda Chuvu	Operational	5

[1] Central Pollution Control Board, Inventorization of Sewage Treatment Plants, 2015

1.2 The Need for Faecal Sludge and Septage Management system in Andhra Pradesh

Although Andhra Pradesh is currently in the process of developing and extending underground sewerage systems, they currently serve less than ten percent of urban households. While this number mayrise in the coming years, it is not projected to reach fifty percent even in major towns and cities over the next decade. Furthermore, the majority of municipalities, those not designated as AMRUT towns, will continue using on- site sanitation (OSS) for the foreseeable future. Across the world, governments are realizing that conventional sewerage systems, while advantageous in certain situations, are not a sanitation panacea as they require huge capital expenditures, consume significant amounts of water, need extensive operations and maintenance throughout their existence and high skill set at municipal level to maintain.

As a result of these factors, Faecal Sludge and Septage Management is a necessary component of the efforts to ensure Andhra Pradesh's towns and cities are clean and sanitary. These efforts will require developing detailed rules and regulations, refurbishing existing septic tanks and latrines and developing desludging, transportation and treatment infrastructure.

While municipalities plan for faecal sludge treatment infrastructure, , they should pursue short-term incremental improvements simultaneously through operationalizing steps outlined in this document. . These incremental improvements may be prioritized for the first year after these guidelines become operative, after which point focusing on longer-term solutions will take priority.

These guidelines will regulate collection, treatment, and disposal of faecal sludge and septage in urban areas in Andhra Pradesh. This following sections details out these guidelines.

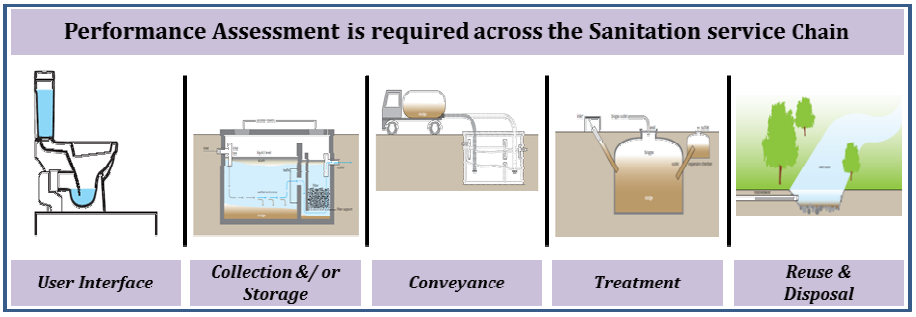
2. Operative Guidelines for Urban Local Bodies

Faecal Sludge and Septage Management (FSSM) for the local bodies includes both residential and non- residential/commercial waste (though not industrial waste). These Operative Guidelines for FSSM seek to empower municipalities with knowledge, procedures and facilities for planning and implementing FSSM . In particular, City Sanitation Task Forces (CSTFs) should take up an active planning and advisory role in cooperation with municipal councils in order to dedicate appropriate resources and attention to the challenges of faecal sludge management.

Step by step approach: Operationalizing Faecal Sludge and Septage Management

Assessing service performance across the sanitation value chain through a town level assessment is the first step in planning process. It is an important exercise, which provides an initial sense of the state of FSSM facility in the town, help in understanding the context and identifying gaps in key services.

The sanitation value chain considers the following 5 stages:



Detailed assessment of services will need to be done across each link in the chain through appropriate field assessments. As policies and regulations already exist for ensuring toilet access, these operative guidelines focus on the last four stages of the value chain: collection and/or storage, transportation, treatment, and disposal or reuse.

2.1 Collection & Storage

Collection and **Storage** describes the ways of collecting, storing, and sometimes initially treating the excreta and grey water generated by toilets. The toilet may be connected to sewerage system; on-site systems like septic tanks with soak pits, leach pits, or may be functioning as Ecosan/composting toilets. Similarly, for grey water disposal, the households may be connected to sewerage system or drains of any kind.

The first step that all municipalities must take is to assess all existing toilets and containment facilities in order to create a comprehensive database. Steps are listed below:

a) Town level assessment of coverage of toilet and on-site sanitation facility using the existing database (like property tax module) or based on recent survey carried out under Swachh Bharat Mission (SBM).

b) If the ULB do not have a database, then ULB shall create database of toilets and containment units. All ULBs shall collected information related to toilet availability, type of toilet, containment typology (septic tank, pit latrine, soak pit, etc.), and its connection with waste water outlet. This information should be linked with property tax databases on e-governance platform. While this evaluation may require an extended timeline, municipalities should develop a plan and timeline to be shared with and monitored by the state government.

c) ULB shall keep updated database related to toilet availability and on-site sanitation through property tax assessment survey carried out from time to time. .

d) Municipalities shall evaluate existing containment units and other storage/treatment systems and modify (in case of variation) based on design mentioned in Annexure 1.

e) Notices should be issued to all property owners whose containment facilities do not meet the standard septic tank design. National/state aid may be sought in order to financially support the conversation of improper containment units into sanitary toilets. .

f) Identify insanitary toilets and convert them to sanitary latrines for safe collection and disposal of waste as per norms set out in Annexure 2.

g) All existing containment facilities should have access covers for each chamber, so that they can be easily opened during emptying process. Where such covers are not available, it should be made compulsory for all property owners to provide proper covers.

h) Pursuant to the previous four steps, municipalities must take efforts to build the capacity of masons and builders to teach them how to construct proper toilets and refurbish improper already-built containment units. Details regarding the codes that must be followed are included in the next item.

i) When new containment facilities need to be built, they should be built as septic tanks designed and constructed as per instructed in the National Building Code, 2005 and CPHEEO Manual, 2013 which takes reference of design norms from IS: 2470 on Code of practice for installation of septic tanks - Part 1: Design and Construction and Part 2: Secondary treatment and disposal of septic tank effluent 1985 (Reaffirmed 1996). The design norms CPHEEO Manual, 2013 is compiled in Annexure 1.

2.2 Transport

Transport describes the movement of sludge across the service chain from individual septic tanks and latrines to municipal or regional treatment facilities. Currently, these services are largely unregulated across Andhra Pradesh, particularly in smaller cities and towns. Municipalities must take on two tasks: **first**, they must regulate operators by establishing a system of licensing, which will facilitate the enforcement of health and safety standards and the prevention of open dumping; **second**, they must design a plan to conduct a system of scheduled emptying in which every containment facility is emptied at least every three years (with more frequent emptying for public accommodations, community/public toilets, and the like). This scheduled emptying will be contingent on having completed a detailed survey of individual containment facilities (as referred to in Section 2.1), and so may not be operationalized immediately; nevertheless, ULBs shall develop plans to do so.

ULBs must take the following steps (some are also required in section 2.1, but at listed here for clarity)

a) Determine how many households use on-site containment systems and ascertain how much sludge they can contain in order to determine the amount of sludge that will be emptied every year (presuming a three-year emptying cycle for individual households and more accelerated cycles on an as-assessed basis for public and commercial facilities).

b) Determine how many septic tanks /pits are emptied annually and what volume of sludge is disposed of at present by looking at actual on-ground practices.

c) Determine the average price per emptying (and accounting for how it may differ based on volume and containment facility location) that operators are charging.

d) Use the above data to determine as to how many trucks would be needed if septic tanks were emptied on a three-year basis and design a database for maintaining a register of containment facilities that are emptied.

e) Create a registration system for private truck operators which permit them to legally empty septic tanks within the ULB. However, these permits will require that they adhere to safety and hygiene standards both in emptying and disposal (detailed below), establish certain regulated tariffs for emptying septic tanks and latrines, and require the use of receipts to track emptying and disposal. The permits and receipts required for this system are included in annexures 3, 4, and 5. Pursuant to this, ULBs should establish a system for penalizing trucks that operate without valid permits/licenses.

f) ULBs should mobilize enough vehicles, either through public or private means, to support a three- year emptying system. This should be done in line with the growth in demand for emptying services, so that trucks are not left underutilized.

As section "e," mentioned previously, truck operators must take the following measures while desludging:

- The septic tanks should not be fully emptied; small amount of sludge of around 1 to 2 inches should be left in the septic tank to facilitate decomposing of incoming faecal waste.
- No fire or flame should be used near the septic tanks as there may be inflammable gases inside septic tanks.
- Proper safety gear (including uniform, tools, and well-maintained vehicles) must be used by the operator while desludging/emptying the septic tanks/Pits. The rules under the Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013 provide for a comprehensive list of safety gear that should be used while providing these services.
- Operators should clean their surroundings before leaving and after desludging; residents should not find their homes or surroundings dirtier.

2.1.3 Treatment, Disposal, and Reuse

Treatment: ULBs must not dispose the faecal sludge /septage collected from septic tank/pits without any treatment and ULBs must comply with CPCB and APPCB norms before disposal of septage. ULBs should assess the load of septage and assess the requirement of capacity for treatment plant. ULBs should first try and assess the possibility of setting up faecal sludge treatment facilities at the solid waste treatment/disposal site or at sewage treatment plants within the city or utilizing co-treatment, pending the advice and recommendations of the appropriate engineering authorities. In particular, the state recommends co-locating purpose-built infrastructure, i.e. building faecal sludge treatment plants next to either sewage treatment plants or solid waste management plants, in order to gain advantage from synergies in operation and maintenance (effluent from FSTP can go to STP, or output of FSTP can be co-composted with solid waste, etc.).

Reuse/disposal refers to the methods in which products are ultimately returned to the environment, as either useful resources or reduced-risk materials. The treated septage can be used as a soil enricher or as filling material at construction sites. ULB should carry out primary assessment for availability of market and demand for reuse.

ULBs shall take the following steps in order to properly treat faecal sludge.

a) Operators shall be forbidden by regulation to dispose offsludge collected from the septic tanks or pits into fields, rivers, nalas, forests, etc. These regulations shall be enforced and violation shall be subject to advertised financial and/or legal penalties. These penalties should come into force as soon as there is a sanitary location for dumping faecal sludge.
b) ULB should first assess the possibility of sludge treatment at existing STP in the city or STP of nearby city through appropriate agreements with STP operators and receiving ULBs. A list of cities that have STPs is given in Table 1. Some STPs are under construction in different cities. Proper tests and assessment should be carried out by STP operators before receiving Faecal sludge/septage.
c) If STP is not available in the city or nearby that can receive the sludge, then ULB should plan for new faecal sludge treatment facility. Such a new faecal sludge treatment plant should be designed to cater to expected volumes of septage generated in urban local body and if faecal waste is expected from nearby rural areas or ULBs.
d) Input quality of the collected septage should be tested at the treatment facility for checking presence of any metal or traces of industrial waste.

e) The faecal sludge treatment plant should be operational during working hours only and a responsible person should be appointed in the facility to ensure that no industrial waste is unloaded in these facilities.

f) Septage should be reused/disposed of only after it meets the parameters in Annexure 6.

Measures to be taken while planning for Faecal Sludge Treatment Plant

Identification of Faecal sludge and septage treatment site is crucial for effective implementation of septage management plan. Following parameters to be taken into consideration before finalization of treatment sites:

- **Distance of treatment site**: Distance from emptying to delivering and accessibility of the treatment site are major issues. The transport of relatively small faecal sludge volumes on congested roads over long distances in large urban areas is financially unfeasible. A site that is too far away implies fewer trips per day, less revenue and more fuel costs to private operators.
- **Reliability of electricity**: It is also important to assess the availability and reliability of electricity if treatment technology has mechanical operated parts; as in case of fluctuations it will increase treatment time and will affect optimal utilization of treatment capacity.
- **Neighbourhood**: A treatment site may generate objectionable odours. For this reason, it should be located at an appropriate distance from the residential areas and communities should be consulted during the process of designating land for a treatment plant.
- **Land availability**: Projects are often delayed because of non-availability or high price of land. ULBs should identify the land bank for treatment facility. ULBs should also explore the possibility of developing faecal sludege and septage treatment facilities near solid waste dumping sites or already existing sewage treatment plants in order to streamline disposal processes: effluent from FSTPs may be treated at an STP, and the treated sludge may be co-composted with solid waste
- **Geological Parameters**: Assessment of existing geological conditions on site including groundwater table, type of soil, flooding risk is always recommended to ensure that the structure can be safely constructed and sludge will not enter the environment through either porous soil or frequent floods.

2.1.4 Awareness generation and capacity building activities

Awareness generation activities need to be taken up for successful implementation of faecal sludge management plan. Wherever possible, these activities should be led by City Sanitation Task Forces, or a sub- committee including members of CSTFs and other interested parties. Where CSTFs do not exist, ULBs should take efforts to establish CSTFs with particular sub-committees on FSM.

These awareness-building activities are crucial, as ULBs do not have the coercive capacity to force citizens to comply with FSM regulations; they must be accepted by citizens. Associated training and capacity building of municipal staff as well as private sector contractors also needs to be taken up.

a) **Awareness generation for residents**: Members of Resident Welfare Associations, community organizers, self-help groups and the general public should be sensitized periodically regarding the need for a safe faecal sludge management system including a 3-year cycle. The health hazards associated with improper collection and treatment of waste, and the ill-effects of sewage discharge into fresh water/storm water drains should be explained to the residents. Sample material for awareness generation is in Annexure 5. Awareness generation activities should be carried out at the beginning of introducing a scheduled service in all wards and then repeated periodically over the three-year cycle.

b) **Capacity building for municipal staff**: Municipal Commissioners, Engineers, Health Officers, Sanitary Inspectors, and Sanitary Workers should be well trained in safe septage management and its best practices. This involves regular training sessions on safe collection, treatment and disposal. Information regarding standard septic tank design, the need for periodic inspection and desludging of septage, design of a treatment facility, tender details for engaging licensed transporters, etc. should be disseminated widely to achieve a safe faecal sludge management system. Training should also be provided on safety standards.

c) **Capacity building for septage transporters/private vendors**: Local Bodies should ensure all safety norms are clearly explained to the septage transporters. Private Operators and Transporters should be well trained in safe collection and transportation of sewage including vehicle design, process of desludging, safety gears and safe disposal at the nearest treatment facility.

d) **Gender Inclusivity:** It is crucial that municipalities look at faecal sludge management through a lens considering gender, particularly concerning the empowerment of women and girls. Women should be equitably involved in the planning of feacal sludge management activities or the formation of local regulations, and any CSTF or sub-committee that discusses faecal sludge management should have a membership consisting of at least one-third women, at minimum.

2.1.5 Record-keeping, Reporting, Monitoring and Feedback Systems (MIS)

Record keeping and manifest forms should be an integral part of a comprehensive septage management program. Recordkeeping requirements should be codified into the law governing the program. A sample manifest form is detailed out in Annexure 5.

a) The completed document or documents with signatures of the household/property, suction truck operator, and treatment plant operator should be submitted to the local government for their records. These documents would validate that the sludge collected from households is disposed of at proper treatment facilities.
b) A database system such as the one discussed in access and collection will need to be developed and maintained.
c) Where possible, GIS should be used to be plan the route of suction emptier trucks and track emptying trucks for regular record keeping.
d) Consumer grievance redressal system for faecal sludge management should also be set up as a part of urban local body record keeping systems and helpline numbers to be shared with residents as a part of monitoring and record keeping systems for faecal sludge management.

2.1.6 Private Sector Participation for Septage Management Activities

For effective operationalize of scheduled septic tank emptying service and treatment facilities, ULBs may also explore the option for private sector participation. Following points to be taken into consideration by ULB:

a) Explore private sector participation for various activities like procurement, operations and maintenance of the suction emptier trucks, construction and operations of septage treatment facility and possible re-users of treated septage within the city as well as in nearby cities.
b) Develop performance based contracts such that payment is linked to the performance of private sector for providing the services.

3. Financial Resources and Considerations in Faecal Sludge and Septage Management

While Faecal Sludge and Septage Management treatment options are significantly most cost effective than conventional sewerage options, they still require capital costs that some municipalities cannot bear. Most of the initial source of funding across the sanitation value chain will have to be provided by the joint effort of the central and state government through allied programme funding like Smart City, AMRUT etc.

Private Funding Options

1. Desludging fee paid by user to the desludging service provider
2. Fine for faulty containment system construction and illegal disposal of faecal sludge.
3. Sale of end products (For Eg. Dried faecal sludge, water).
4. Property tax designated for FSM.

State and Municipal Funding Options

a) As per the Andhra Pradesh Municipal Corporation Act, 1955 – conservancy tax can be levied on all the properties by the Corporation where city undertakes the collection, removal and disposal of excrementitiously and polluted matter from privies, urinals and cesspools.

b) Periodic revisions for the taxes/ charges to be effected based on revisions in costs involved.

c) To the extent possible, revenues should be generated from sale of treated septage for agriculture or other purposes.

Additional Funding Options

a) ULB may utilize the funds from **14th Finance Commission** to implement the various components related to septage management plan. Creation of database for toilets and septic tanks, procurement of suction emptier trucks and construction of septage treatment facilities are the permissible components to utilize the 14th FC funds. The funds would also be provided as preparatory activity like preparing detailed project report and prefeasibility report for septage management.

b) **IEC & Capacity building funds**: IEC funds under SBM can be utilized for various awareness generating activities. This applies to ULBs using funds to implementing septage management plan, and can include funding capacity building activities for ULB staff, septage transporters, treatment plant operators, and ULB residents.

c) **Convergence with existing schemes/activity**: ULBs can ask for funds under the existing state and national schemes such as Smart City Mission AMRUT

d) **Corporate Social Responsibility**: ULBs can also raise funding through Corporate Social Responsibility.

4. Technology Options for Septage Management

Treatment options for faecal sludge /septage are based on four treatment objectives. These four mechanism enable sludge to be handled, disposed of, and/or re-used safely.

1. **Solid liquid separation:** Solid-liquid separation is the first step for successful treatment of feacal sludge, as refuse must be brought to some sort of uniform consistency.
2. **Dewatering**: Before treatment, faecal sludge is over 80-90% water by volume; de-watering is necessary to reduce volume/weight and destroy the habitat that allows dangerous pathogens to grow.
3. **Stabilization**: Stabilization refers to several biological and chemical processes through which ongoing biological-chemical reactions run their course and nutrients are consumed by bacteria.
4. **Reuse applications**: Once the previous three steps have been accomplished, sludge can be re-used for productive purposes or sent on for further treatment (such as co-composting with solid waste) depending on its chemical/biological profile.

Septage containment and treatment technology options are included according to Swachh Bharat Mission Guidelines in the following table. In any given context, the technology choice for conveyance system generally depends on the following factors:

- Type and quantity of products to be transported
- Distance from containment facilities
- Accessibility
- Topography
- Soil and groundwater characteristics
- Financial resources
- Availability of a service provider
- Management considerations

Technologies for Faecal Sludge management based on the above objectives can be adopted as mentioned in Table 2.

Urban Local Bodies can choose from a range of treatment options available in the market, depending upon their needs and available finances.

Table 2 – Technical Options Across the Faecal Sludge Value Chain

Containment	Transport	Treatment			Reuse
		Solid/Liquid	Dewatering	Further Treatment	
Septic Tank (preferred)	Small Vacuum Truck (1,500 – 3,000 litres)	Imhoff Tanks	Mechanical	Co-composting	Soil conditioner
Twin Pit System	Large vacuum truck (3,000	Settling /Thickening Tanks	Unplanted drying beds	Deep row entrenchment	Irrigation
Aerobic bio-digester			Thermal Drying	Sludge incineration /pyrolysis	Building Material
Anaerobic bio-digester			Solar Drying	Anaerobic digestion	Biofuel
			Planted Drying beds	Black soldier flies /vermicomposting	Proteins
				Lime/Ammonia	
				Co-treatment with wastewater up to 3% FS of current STP load	

*Adopted from IWA publication *Faecal Sludge Management Systems Approach for Implementation and Operation, IWA Publications, 2014.*

Annexure 1: Septic Tank Specifications, Guidelines, and Designs

Depending on the geography, soil condition, water seepage capacity of the soil the design can be prepared and approved by the Local Bodies. Proper septic tank design considers the following factors:

- Sized properly with appropriate sludge detention time, volume and hydraulic
- retention time
- Proper inlet and outlet structures
- At least one baffle separating the tank into multiple compartments
- Water tight
- Access port for each compartment that allows for inspection and pumping

Table1: recommended Sizes of Septic Tanks as per Number of Users

Number of Users	Length (M)	Breadth (M)	Liquid Depth for a Cleaning Interval of 3 Years (M)
5	1.50	0.75	1.05
10	2.00	0.90	1.40
15	2.00	0.90	2.00
20	2.30	1.10	1.80
50	5.00	2.00	1.24
100	7.50	2.65	1.24
150	10.00	3.00	1.24
200	12.00	3.30	1.24
300	15.00	4.00	1.24

(Note; The CPHEEO Manual and NBC code IS 2470 Part I 1985 may be referred for exact calculations)

Table 2: Existing guide lines for design and construction of septic tanks

Parameters	Existing Guidelines	Source Of Guideline	General Observations
Location	Septic tanks are recommended only for individual homes, small communities and institutions whose contributory population size doesn't exceed 300	**CPHEEO Manual**	*While all existing guidelines state that the location of septic tank should be given due consideration, in reality, the location of the septic tanks are practically based on the land availability within the household vicinity*
	A sub soil dispersion system shall not be closer than 18 meters from any source of drinking water, such as well, to mitigate the possibility of bacterial pollution of water supply	**NBC, Part 3: Development Control Rules and General Building Requirements**	
	Septic tank should be located at a place open to sky, as far away as possible from the exterior of the wall of building and should not be located in swampy areas or areas prone to flooding.	**IS 2470, Part-1**	*Local masons unaware of the existing*
	Septic tanks should have a minimum width of 750 mm, depth of 1 meter below water level and a minimum water capacity of 1 cubic meter. The length of the tank shall be 2 to 4 times the width.	**NBC, Part 3: Development Control Rules and General Building Requirements**	*design/construction guidelines for construction of septic tanks. The criterion governing the design and construction broadly is the land availability and the funds available with the house owner / property builders*
Design and Construction	The minimum nominal diameter of the pipe shall be 100 mm. Further at junctions of pipes in manholes, direction of flow from a branch connection shall not make an angle exceeding 45 degrees with the direction of flow in main pipe		
	Every septic tank shall be provided with a ventilation pipe of at least 50 mm diameter	**IS 2470, Part -1**	
	The liquid depth should be 2-3 m and the length to depth ratio should be 2-3 to 1. The liquid depth of the septic tank should be calculated depending on the cleaning interval of the septic tank (For detail length, breadth and liquid depth for various number of users please refer the Manual); A provision of 300 mm should be made for free board	**CPHEEO; IS 2470, Part-1**	
	When served for a population above 100, the septic tank may be divided into independent parallel chambers for operation and maintenance		
	Baffles are provided at inlet and outlet and should dip 25 to 30 cm into and project 15 cm above the liquid. The invert of the outlet		pipe should be provided at 5 to 7 cm

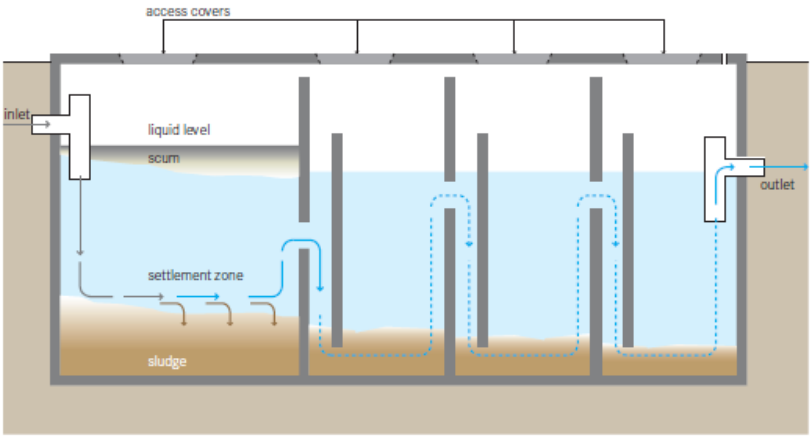
below the invert level of inlet pipe.

The height of the ventilation pipe should extend at least 2 m above the height of the highest building within 20 meters radius

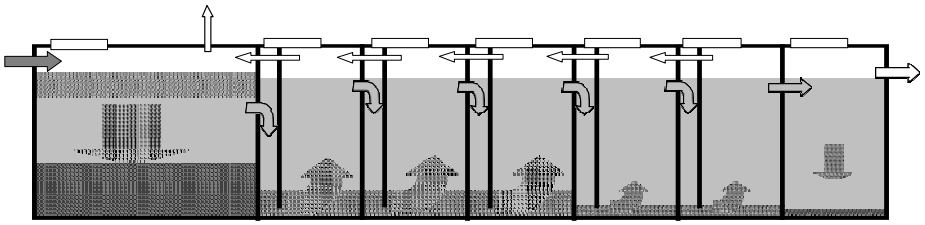
Improved Septic Tank" - the walls of the conventional septic tank can be replaced with baffle walls to have a multi chambered baffled septic tank. The paper states "This movement of wastewater inside the tank helps in creating the turbulent flow which causes enhanced mixing of the raw sewage with already existing activated sludge and accelerates the decomposition of the solids because of intensive contact between the activated sludge and fresh influent".	**CSE Policy Paper on septage management in India**

Design for improved septic tank- three chamber with anaerobic baffled reactor

Design for improved septic tank- three chamber with anaerobic baffled reactor



Anaerobic decentralized waste water treatment systems (DEWATs



Annexure 2: Guidelines for Conversion of Insanitary Latrines into Sanitary Toilets

Table: Existing guide lines for leach pits

Parameters	Existing Guidelines	Source
Size(five members)	Dia – 1000 mm preferred but 750 mm also permitted where space is a constraint Depth – 1300 mm	CPHEEO
Emptying	Single pit – 6 years, Twin pit – 3 years each	CPHEEO
Shape	Circular preferred; but rectangular, oval and square also allowed where space is a constraint	CPHEEO
Location	Pits should be placed symmetrically at the back side of the pan. Can be located within premises, under foot pat/road/narrow lane The distance between foundation and pit should be between 0.2 to 1.3 m A minimum distance of 3 to 10 m from water sources such as tube wells and 3 to 10 m from water mains Water pipe should not cut across the pit	CPHEEO
Design and construction	The pits should be lined to avoid collapsing. Bricks joined in 1:6 mortar commonly used for lining. Stones or laterite bricks of cement concrete rings could also be used. Lining brick work 115 mm thick (half brick) with honey combing up to the invert level of incoming pipe or drain. Size of holes 50 mm wide up to the height of brick course Pit bottom should be left in natural condition RCC slab is used for pit cover Toilet pan is connected to the pit through a 75 mm brick channel of U shape	CPHEEO

Annexure 3: Form for Application for the License the Collection, Transportation and Disposal of Septage in Andhra Pradesh

Paste Self-Attested Recent Passport Size Photograph

1. Name of the applicant: Shri/Ms_____
2. Nationality: Indian_____Other_____
3. Address: Regd. Office:_____Head office: _____
4. Telephone No.: (O)_____Mobile No._____Email ID_____
5. Registration No. of Vehicle :_____
6. Pollution certificate of the vehicle valid up to:_____
7. Insurance of the vehicle valid up to:_____
8. Fitness of the vehicle valid up to:_____
9. Vehicle, whether fitted with GPS:_____
10. Details of the vehicles indicating model, type, capacity, leak proof, odour and spill proof having propervacuum/ suction and discharging arrangement (Document proof of any may be enclosed).
11. Processing fee for license Rs. 1000/- (Non-refundable)
    D.D. No._____Date_____Bank_____

I/We certify that information given by me/us in column 1 to 11 are true to the best of my knowledge and belief. I also certify that I have read and understood the attached terms and conditions 1 to 13 and agree to abide by them. I agree that if any information given by me is found wrong the application for license will be liable for cancellation at any time.

Signature(s) of applicant(s)

No. of document attached:_____ Date: _____

Annexure 4: License for Collection and Transportation of Septage

In accordance with all the terms and conditions of the By-laws/ Regulations, Municipal Corporation Act rules, the special license conditions accompanying this license and applicable rules and laws of Government of Andhra Pradesh, the permission is hereby granted to:

NAME OF

LICENSEE……..

ADDRESS……

…

For the disposal of septage from septic tanks in TOWN HERE

This license is based on information provided in the Septage Collection and Transportation License Application. This license is effective for a period of five years from date of issue, set forth below.

EFFECTIVE DATE EXPIRATION DATE

The license may be suspended or revoked for Condition of Non Compliance and is not transferable. The original license shall be kept on file in the Licensee's office. A copy of this license shall be carried in every registered vehicle used by theLicensee.

Annexure 5: Collection and Transport Records

Sample Form to be filled by Operator/Transporter of Feacal Sludge

i. Identification of Waste:

a) Volume: _____

b) C:_____Septic Tank ____Others (Please Specify):

c) Source: _____ Residential____Commercial____Restaurant ____Portable Toilet ____Others

ii. Details of Waste Generator

a) Name

b) Phone Number

c) Address

d) Pin

The undersigned being duly authorized does hereby certify to the accuracy of the source and type of wastewater collected and transported.

Date:_____Signature:_____Proposed Date for Next Desludging (Year): ___

iii. Details of Transporter / Operator

a) Company Name:

b) Permit #

c) Vehicle License #

d) Pump out date

The above described feacal sludge was picked up and hauled by me to the disposal facility name below and was discharged. I certify that the foregoing is true and correct:

e) Signature of authorized agent and title: _____

iv. Acceptance by_____Municipality's authorized FSTP/STP

The above transporter delivered the described feacal sludge to this disposal facility and it was accepted.

Disposal date:_____Amount Collected from Transporter:_____

Signature of authorized signatory and title: _____

NOTE: SUBJECT TO THE TERMS AND CONDITIONS OF_____MUNICIPALITY

Annexure 6: Safe Reuse and Disposal of Treated Septage[2]

Table 1: Compost Quality as per MSW Rules, 2000

Parameter	Concentration not to exceed (mg/kg dry basis, except for pH and carbon to nitrogen
Arsenic	10
Cadmium	5
Chromium	50
Copper	300
Lead	100
Mercury	0.15
Nickel	50
Zinc	1000
C/N ratio	20 – 40
pH	5.5 – 8.5

For dewatered septage/sludge can be used as fertilizer in agriculture application, it should satisfy the following criteria of Class A Bio-solids of US EPA: A faecal coliform density of less than 1000 MPN/g total dry solids, Salmonella sp. density of less than 3 MPN per 4 g of total dry solids. WHO (2006) suggests Helminth egg concentration of < 1/g total solids and E coli of 1000/g total solids in treated septage for use in agriculture

MSW Rules (2000) recommended the quality for compost as referred to Table below.

In the absence of any standards, it is recommended that these be adopted until such time standards are notified by the Central Pollution Control Board.

Properly treated sludge can be reused to reclaim parched land by application as soil conditioner, and/or as a fertilizer. Deteriorated land areas, which cannot support the plant vegetation due to lack of nutrients, soil organic matter, low pH and low water holding capacity, can be reclaimed and improved by the application of treated septage. Septage sludge, as a result of lime stabilization has pH buffering capacity that is beneficial for the reclamation of acidic soils. Treated septage contains nutrients in considerable amounts, which supports the growth of a number of plants.

Drip irrigation is the preferred irrigation method for settled septage effluent when irrigation is feasible. Crops which could be safely grown are corn, fodder, cotton, trees including fruit trees, eucalyptus and poplar.

Aquaculture can be practiced for settled septage effluent when freshwater is available to achieve dilution to ensure dissolved oxygen is above 4 mg / l. Fish species of tilapia and carp are preferred since they tolerate low dissolved oxygen. Both drip irrigation and aquaculture need land and are feasible at city outskirts.

[2] Source: Advisory note: Septage Management in Urban India, Ministry of Urban Development, Government of India. (2013) and Guidelines for septage management in Maharashtra. (2016)